EQUALISER FOR DIGITAL COMMUNICATIONS SYSTEMS AND METHOD OF EQUALISATION

Abstract of the Disclosure

Equalisation of a communication channel is achieved through use of a Wiener filter frequency response mechanism that operates to transform both the received data and the channel impulse response into frequency domain representations using a Fast Fourier Transform (FFT). Subsequently, spectral equalisation of data spectra and a channel spectrum in the frequency domain yields an equalised packet spectrum that can be converted back into the time domain by an inverse FFT function. Ratio comparison of the data spectra with the channel spectrum and conversion back into the time domain equalises the channel to appear as white by resolving-induced inter-symbol interference. Matrix manipulation, i.e. transformation, of STTD samples (in the form of real and imaginary vectors) incident to a receive antenna allows FFT processing of encoded data, initially presented on either a chip-wise or symbol-wise basis in an information slot or packet. The matrix manipulation defines a set of samples seen at the receive antenna in terms of both a complex multiplexed transmitted sample sequence sent from a plurality of sources across separate paths that are affected by respective channel impulse responses. Operating a FFT regime in the frequency domain avoids extensive signal processing requirements associated with joint detection algorithms in high data rate application, with processing load made independent of channel impulse response duration. The principle of applying Fourier transformation techniques in equalisation is also applicable to systems employing multiple transmit elements and multiple receiver elements, such as in space-time coding (STC) schemes.